Difference between Meeting and Crossing

Meeting : "Instantaneous process"

Crossing : "It is a time taking process".

We generally get Questions on Crossing of Trains

Distance covered by the train when the train crosses an object:

$$D = L_T + L_O$$

Where:

L_T = Length of Train

L_O = Length of Object

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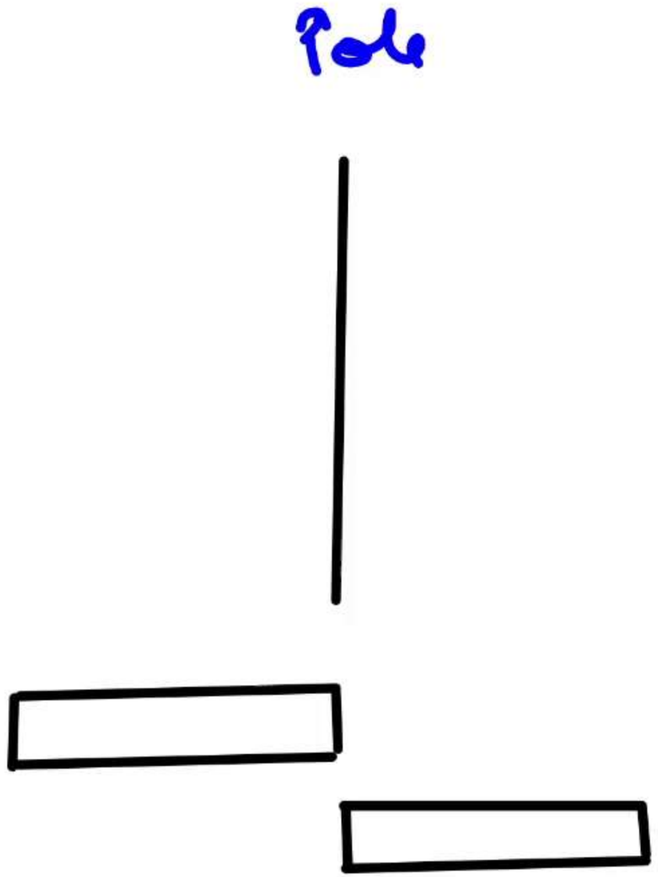

Where:

L_T = Length of Train

L_O = Length of Object

Pole | Man | Tree $L_O = 0$

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U'S PREP

Speed → Relative Speed

$S = (S_A - S_B)$ [Same Direction]

$S = (S_A + S_B)$ [Opposite Direction]

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

Generally, Distance is given in 'm' and Speed is given in 'km/ hr'.

So, always focus on the units.

Train

$L_T = 500\ m$

Pole

$D = 500\ m$

$L_T = 500\ m$

Platform

$D = 2500\ m$

2000 m

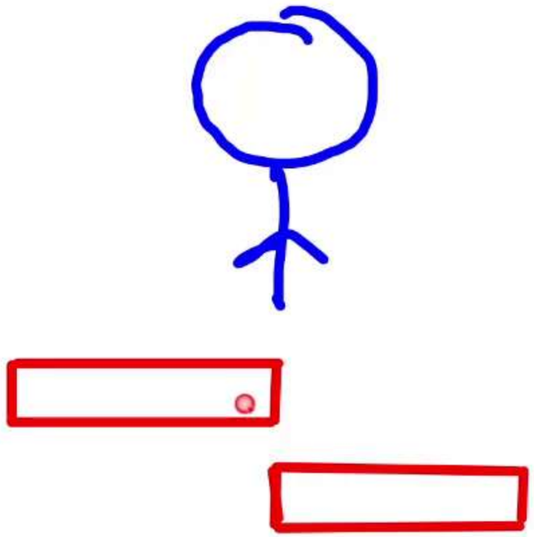
BASIC POINTS WHICH WILL HELP IN SOLVING QUESTIONS

(1)When a train crosses a man (stationary), crosses a man walking @ 2km/hr or crosses a man walking @ 10 km/hr.

In every case:

$$D = L_T \text{ (Length of the train)}$$

Here, D refers to the distance which the train has covers extra with respect to the man.



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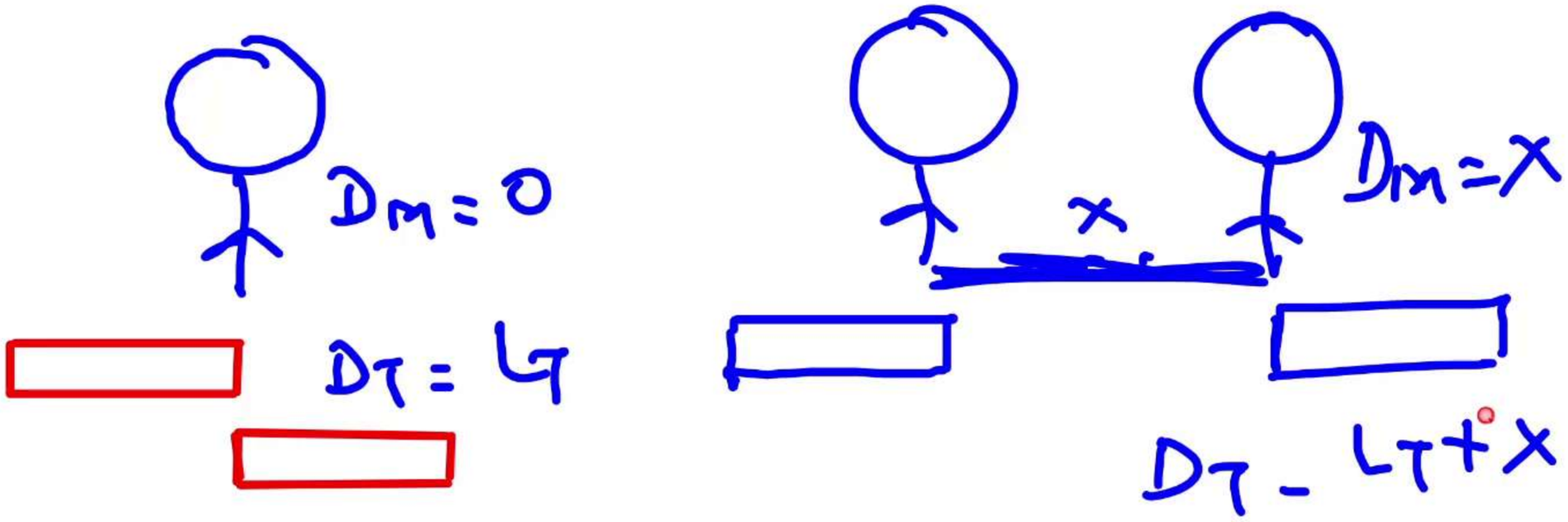


BYJU'S EXAM PREP

* Whether Man

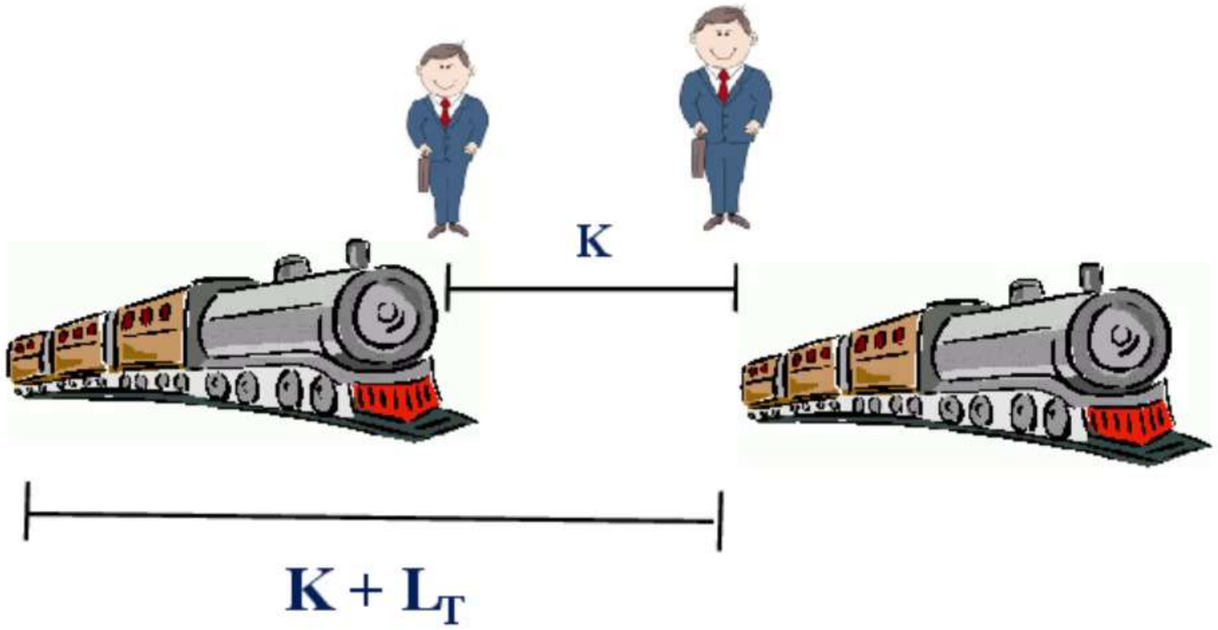
Stationary

Walking

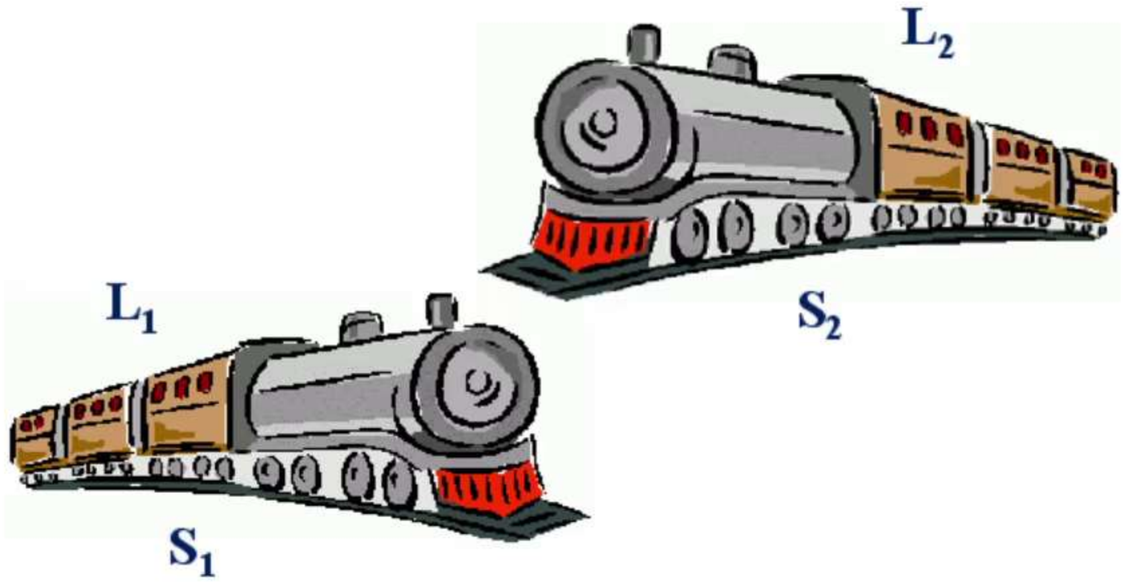
Running

$$D = LT$$

$$D = L_T$$



$$D = L_T$$

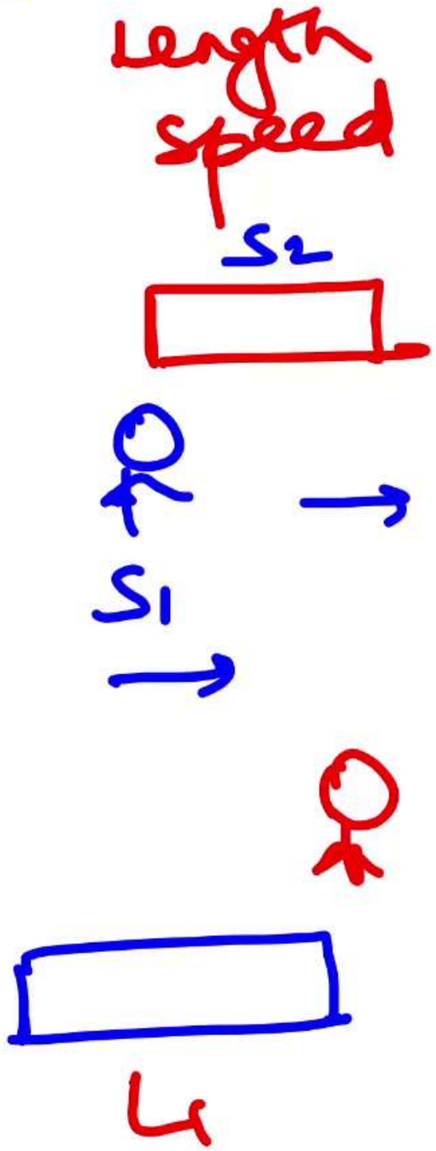


Train 1 crosses Train 2

$$D = L_1 + L_2$$

$$S = \begin{cases} S_1 - S_2 & \text{(Same Direction)} \\ S_1 + S_2 & \text{(Opposite Direction)} \end{cases}$$

$$T = \frac{D}{S}$$



Train 1	Train 2
L_1	L_2
S_1	S_2

(1) **A person sitting in Train 1 crosses Train 2.**

$$D = L_2$$
$$S = S_1 - S_2$$

(2) **Train 1 crosses a person sitting in Train 2.**

$$D = L_1$$
$$S = S_1 - S_2$$

U'S
PREP

Q1. A train passes a man standing on a platform in 8 seconds and also crosses the platform which is 264 metres long in 20 seconds. The length of the train (in metres) is:

(a) 188 (b) 176

(c) 175 (d) 96

Man → 8sec

Platform (264m) → 20sec

$L_T = ?$

I st

12sec → 264m

1sec → 22m

8sec → 176m

$L_T = 176m$

IInd

$D = S \cdot T$

$$\frac{L_T}{L_T + 264} = \frac{8^2}{20^5}$$

$5L_T = 2L_T + 528$

$L_T = 176m$

Q2. A train passes two bridges of lengths 800 m and 400 m in 100 seconds and 60 seconds respectively. The length of the train is:

(a) 80 m
(b) 90 m
(c) 200 m
(d) 150 m

800m ⟶ 100sec

400m ⟶ 60sec

40sec ⟶ 400m

60sec ⟶ 600m

600m ⟶ 400 + LT

LT = 200m

Q3. Two trains 105 m and 90 m long runs at the speed of 45 km/hr and 72 km/hr respectively, in opposite directions on parallel tracks. The time which they take to cross each other is

(a) 8 sec
(b) 6 sec
(c) 7 sec
(d) 5 sec

$$D = S \cdot T$$

$$(105+90) = (45+72) \cdot \frac{5}{18} \cdot T$$

$$195 = 117 \cdot \frac{5}{18} \cdot T$$

$$T = 6 \text{ sec}$$

Q4. Two trains, 80 m and 120 m long, are running at the speed of 25 km/hr and 35 km/hr respectively in the same direction on parallel tracks. How many seconds will they take to pass each other?

(a) 48 (b) 64

(c) 70 (d) 72

$$200 = 10 \cdot \frac{5}{18} \cdot T$$

$$T = 72 \text{ sec}$$

U'S
PREP

Q5. A train crosses a tunnel half of its length with a speed of 72 Km/Hr in 1 min., then find in how much time it will cross another train of double length which is standing on platform with 60% of its speed?

(a) 120 sec (b) 200 sec

(c) 240 sec (d) 300 sec

72km/hr

Train Tunnel S T

2 : 1

60sec

60% S

Train Train T

2 : 4

??

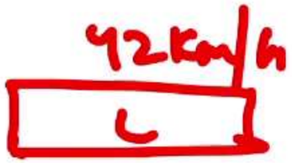
$$60 \times 2 \times \frac{5}{3}$$

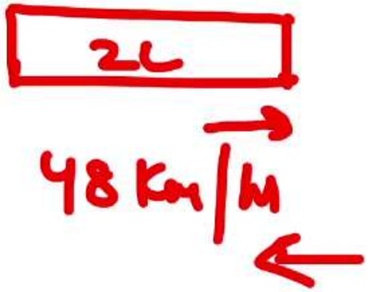
$$= 200 \text{ sec}$$

Q6. A train travelling at 48 km/hr crosses another train, having half its length and travelling in opposite direction at 42 km/hr, in 12 seconds. It also passes a railway platform in 45 seconds. The length of the railway platform is

(a) 200 m (b) 300 m

(c) 350 m (d) 400 m





12 sec

Platform Lp

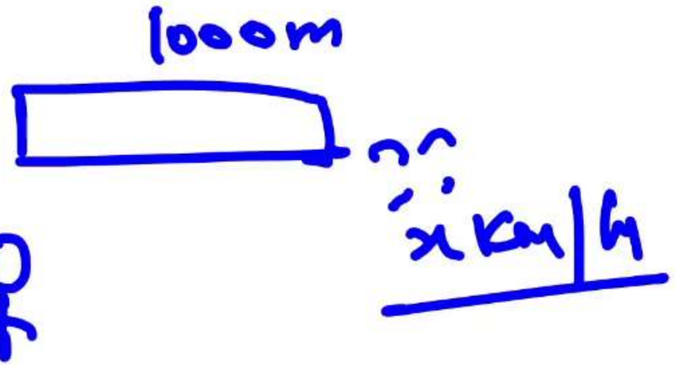
45 sec

$3L = 90 \cdot \frac{5}{18} \cdot 12$

$L = 109$

$200 + L_p = 48 \cdot \frac{5}{18} \cdot 45$

$L_p = 400\text{m}$



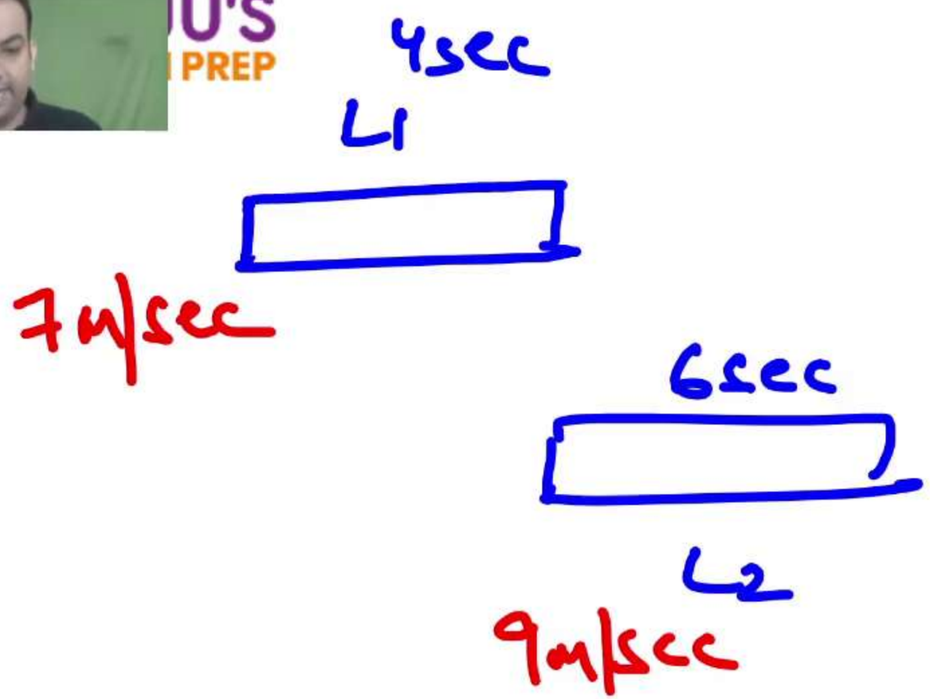
Q7. Two trains are moving on two parallel tracks but in opposite directions. A person sitting on a train running at 80km/ hr passes the second train in 18 sec If the length of 2nd train is 1000m, its speed is (in km/ hr)

(a) 100 (b) 120

(c) 140 (d) 150

$$\frac{1000}{200} = (80 + x) \cdot \frac{5}{18} \cdot 18$$

$$x = 120$$



Q8. 2 trains can cross a pole in 4 sec and 6 sec respectively find in how much time will they cross each other if they are coming from same direction and the speed of the trains are in 7:9 ratio.

(a) 14 sec
(b) 41 sec
(c) 27 sec
(d) 82 sec

$L_1 = 28m$

$L_2 = 54m$

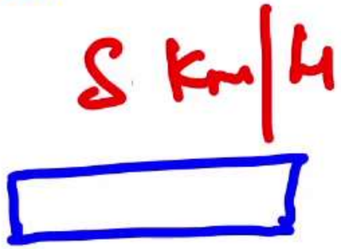
$82m = 2 \cdot T$

$T = 41sec$

Q9. A train passes two persons walking in the same directions as of train at a speed of 3 km/ hr and 5 km/ hr respectively in 10 seconds and 11 seconds respectively. The speed of the train is

(a) 28 km/ hr (b) 27 km/ hr

(c) 25 km/ hr (d) 24 km/ hr



10sec

3Km/H

11sec

5Km/H

Sol^N

$$\frac{(S-3)}{(S-5)} = \frac{11}{10}$$

$$10S - 30 = 11S - 55$$

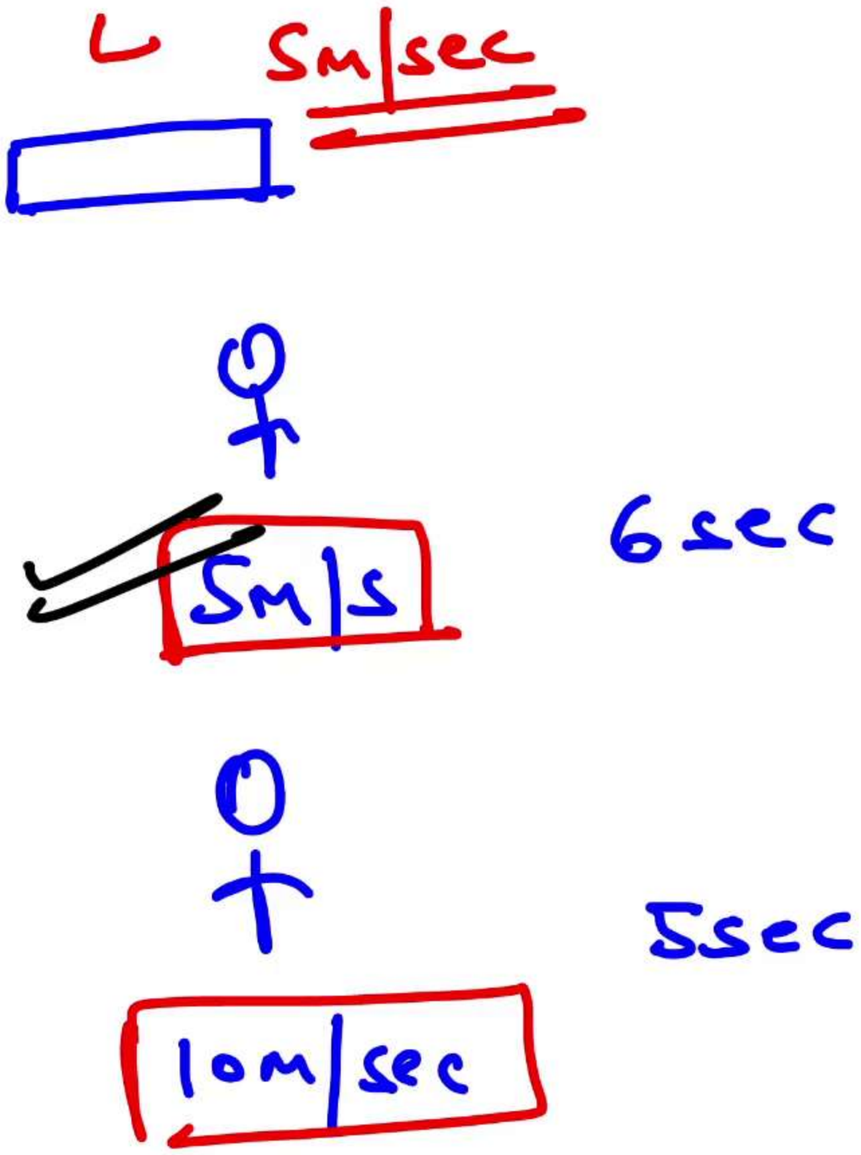
$$S = 25\ Km/H$$

U'S
PREP

Q10. A train passes two persons walking with speed of 5 m/s and 10 m/s in 6 seconds and 5 seconds respectively. Both persons are walking in opposite direction train. Find the length of train?

(a) 125 m (b) 150 m

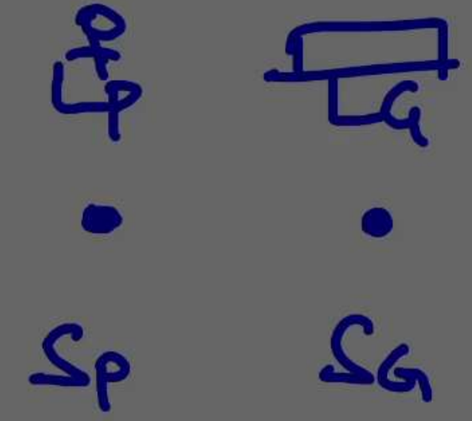
(c) 160 m (d) 170 m



$$\frac{S+5}{S+10} = \frac{5}{6}$$

$$S = 20\ m/sec$$

$$25.6 = 150m$$



Q11. A goods train and passenger train are moving on parallel tracks in same direction. Driver of goods train notices that passenger train coming from back, passes his train completely in 60 seconds. But a passenger, who is sitting in passenger train notices that he passes the goods train in 40 seconds. If the speeds of trains are in ratio 1:2 then find the ratio of their length?

(a) 1:2
(b) 2:1
(c) 3:2
(d) 2:3

$$L_p + L_G = (S_p - S_G) \cdot 60 \quad \text{---(1)}$$

$$L_G = (S_1 - S_G)\ 40 \quad \text{---(2)}$$

$$\frac{(1)}{(2)} \div \frac{(1)}{(2)} = \frac{L_p + L_G}{L_G} = \frac{3}{2}$$

$$L_p : L_G$$

$$1 : 2$$

$$2 : 1$$

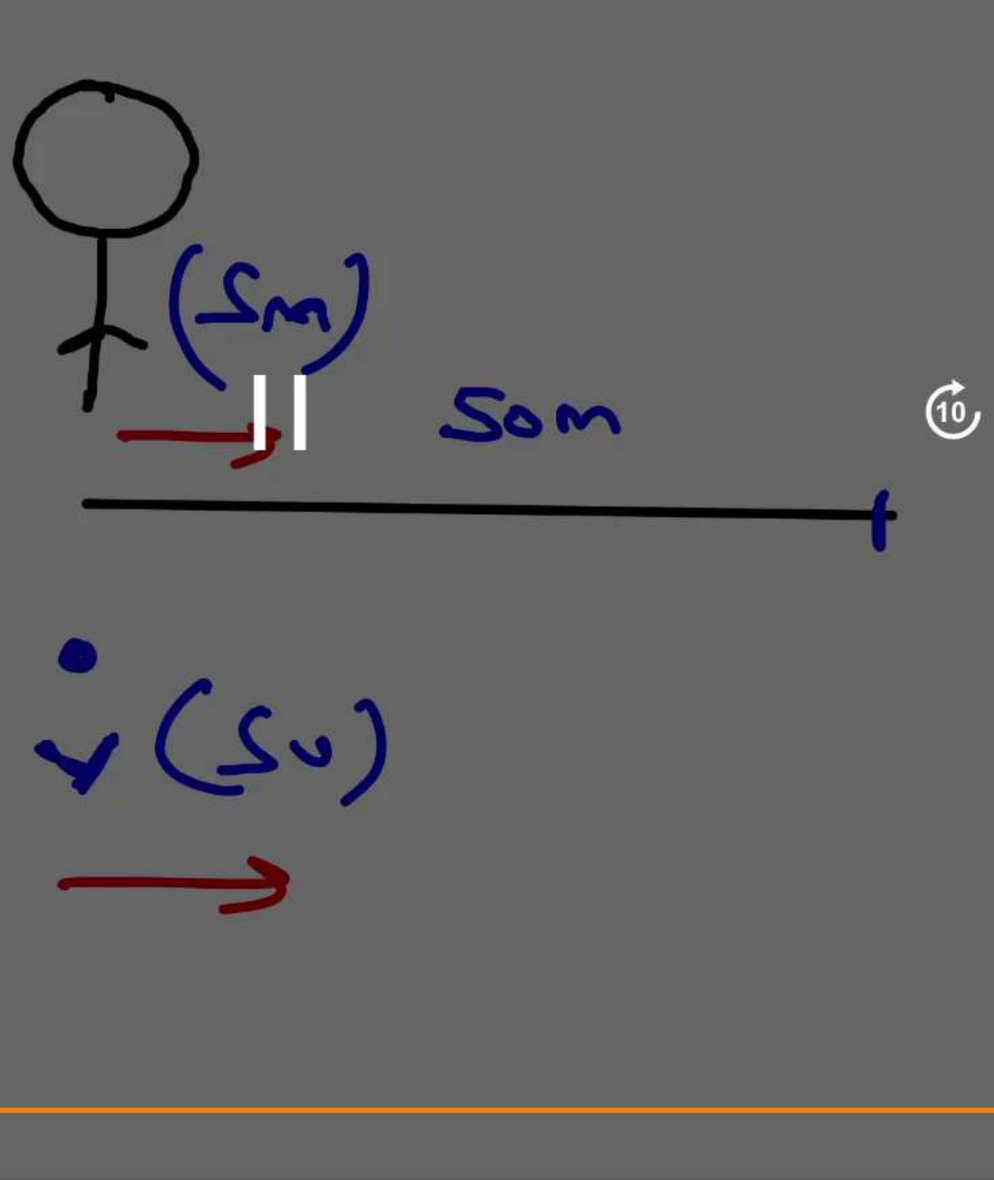
QUESTIONS BASED ON FOG

*

$D = S \cdot T$

10

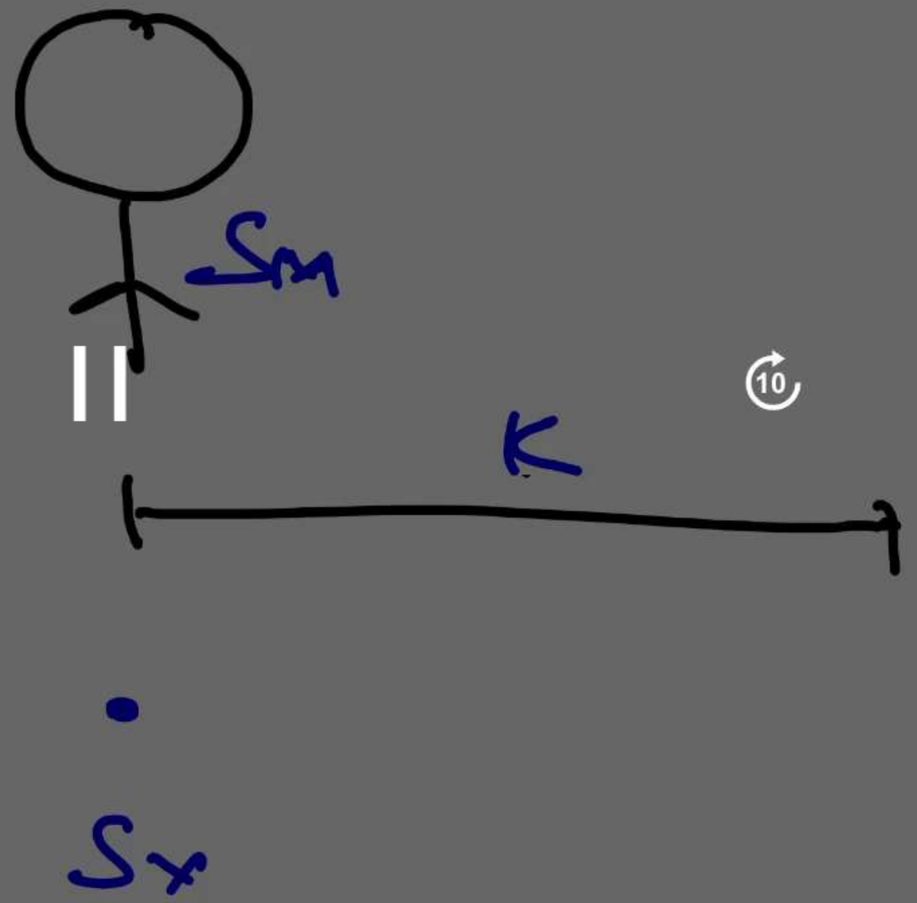
$S_o = (S_Y - S_M) \cdot T$

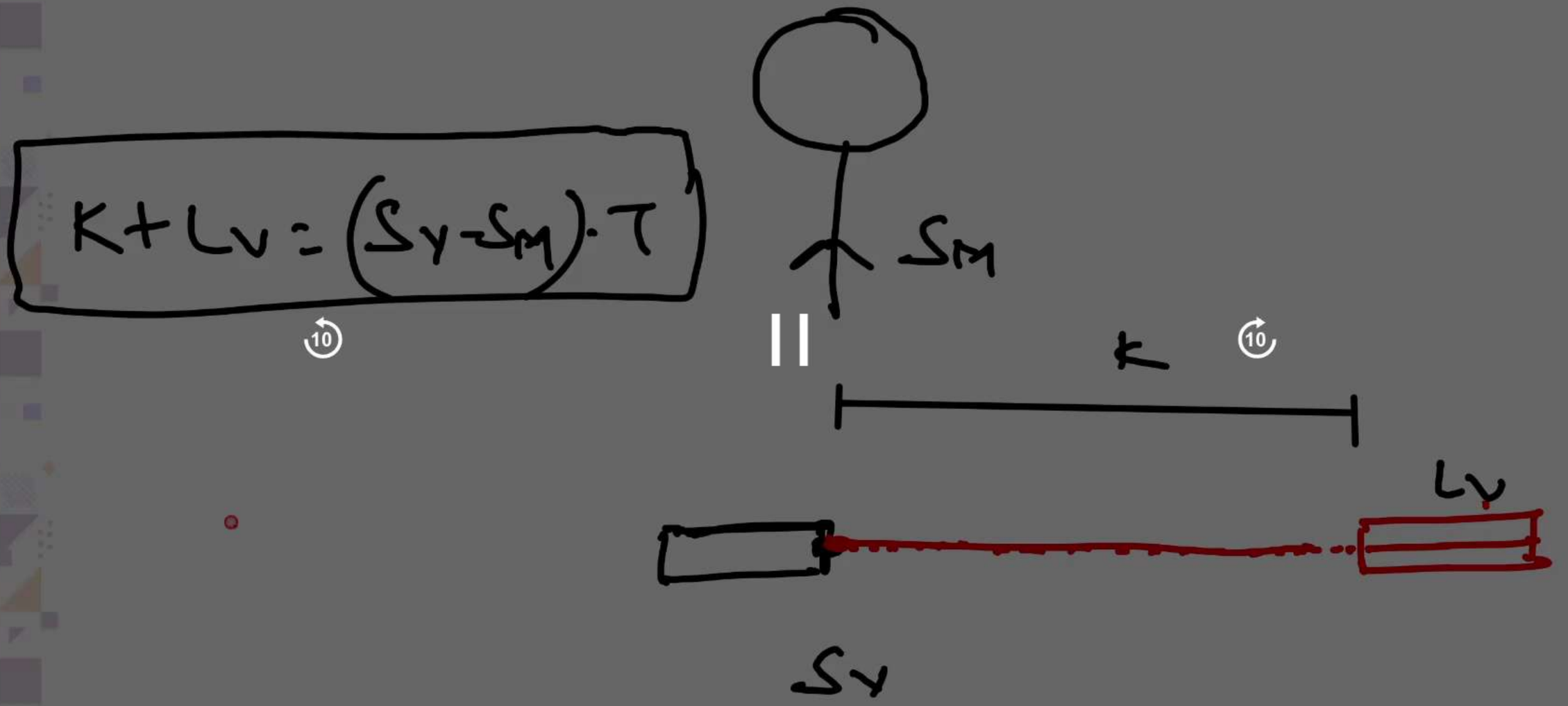


QUESTIONS BASED ON FOG

$$D = S \cdot T$$

$$K = (S_Y - S_M) \cdot T$$




K + Lv = (Sy - Sm) · T
10
Sm
10
K
Lv
Sy

* The vehicle is coming from behind

$$D = S \cdot T$$

$$(2K + L_V) = (S_V - S_M) \cdot T$$

Trains

PREP

Q12. A carriage driving in fog passed a man who was walking at the rate of 6km/hr, in the same direction. He could see the carriage for 4 minutes and if visibility was 200m, the speed of the carriage was:

(a) 8.75 kmph (b) 8.5 kmph

(c) 8 kmph (d) 9 kmph

$S_M = 6 \text{ Km/h}$

$T = 4 \text{ min}$

Visibility = 200m

$$0.2 = (S_Y - 6) \cdot \frac{4}{60} \cdot \frac{1}{15}$$

$$3 = S_Y - 6$$

$$S_Y = 9 \text{ Km/h}$$

01:04:56/01:10:15

1x

Trains

PREP

Q13. A man could see 400 m during fog when he was moving with 4 Km/ Hr, he saw a train coming from behind & disappeared in 3 minute if the length of train is 200 m, find the speed of the train?

(a) 20 km/ hr (b) 24 km/ hr

(c) 30 km/ hr (d) 40 km/ hr

$D = S \cdot T$

$1 = (S_T - 4) \cdot \frac{3}{60}$

$S_T - 4 = 20$

$S_T = 24 \text{ Km/h}$

01:06:53/01:10:15

1x

Q14. A train crosses a man going along the railway track at 6 Km/Hr. The man could see the train upto 2 minute and find the speed of the train if at the time of disappearance the distance between train to man was 1200 metre & length of train is 300 metre ?

(a) 39 km/hr (b) 45 km/hr

(c) 51 km/hr (d) 57 km/hr

$S_m = 6\ Km/h$

$T = 2\ min$

$S_T = ??$

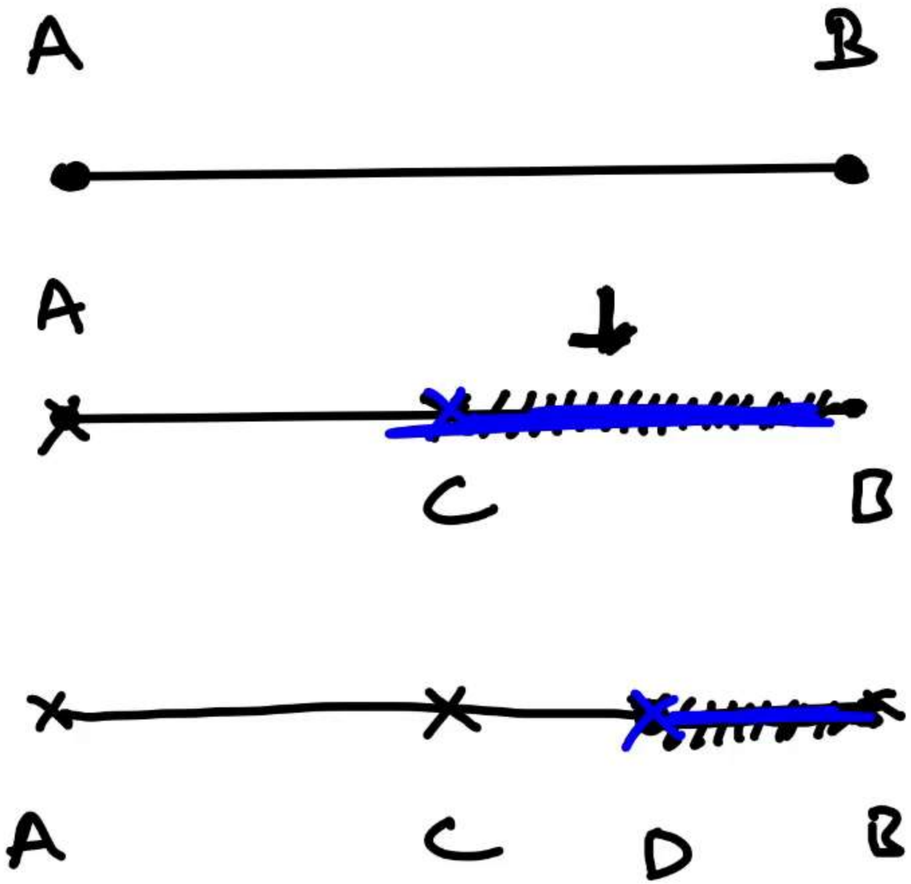
$1.5 = (S_T - 6) \times \frac{5}{18}$

$S_T - 6 = 45$

$S_T = 51\ Km/h$

QUESTIONS BASED ON ACCIDENT OF TRAINS

Concept



5pm (On time)

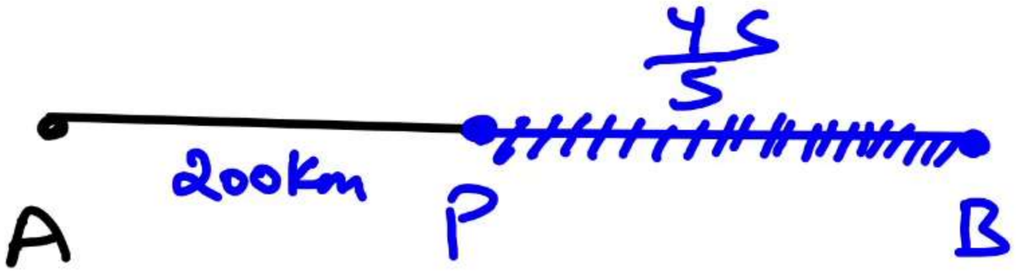
5:20pm

5:10

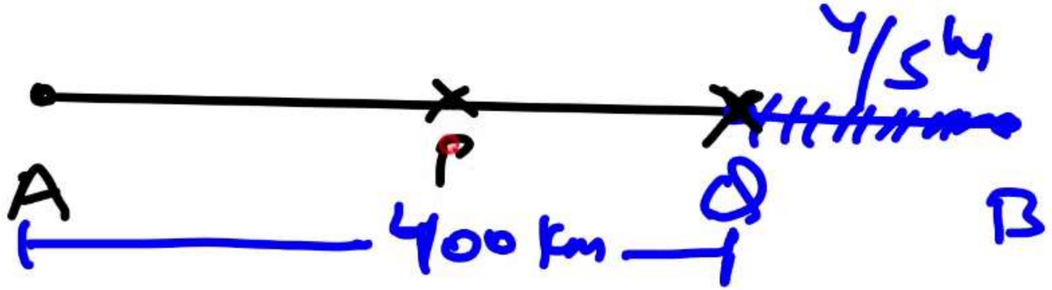
Speed of Train = S ??

Distance b/w = D ??
A & B

ON TIME



2hrs late



1 1/2 hrs late

$$\frac{D}{S} = T$$

$$\frac{200}{S} + \frac{D-200}{\left(\frac{4}{5}\right)S} = T+2 \quad \text{(1)}$$

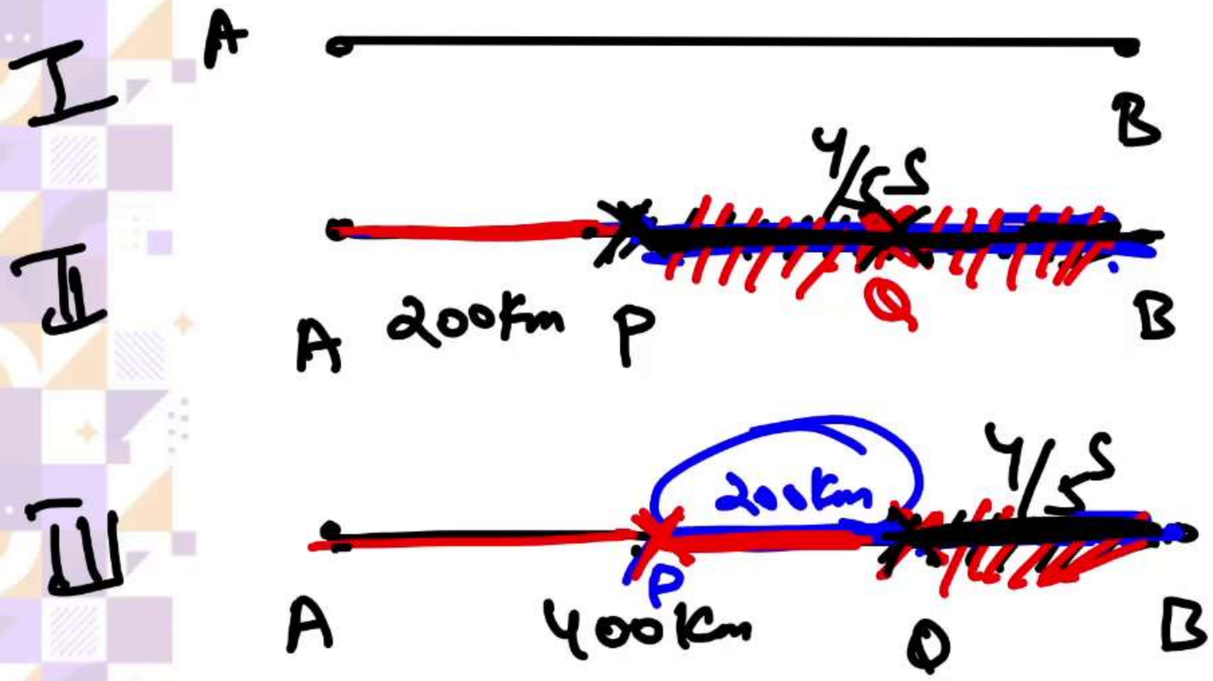
$$\frac{400}{S} + \frac{D-400}{\left(\frac{4}{5}\right)S} = T+1\frac{1}{2} \quad \text{(2)}$$

(1) − (2)

$$\frac{-200}{S} + \frac{200 \cdot 5}{4S} = \frac{1}{2}$$

$$\frac{50}{S} = \frac{1}{2}$$

$$S = 100 \text{ Km/h}$$



2 : 1 1/2

= 4 : 3

PB = 800 km

Total D = 1000 km

III (PQ) $S \cdot T = 200$

II (PQ) $\frac{4}{5}S \cdot \frac{5}{4}T = 200$

$\frac{1}{4}T = \frac{1}{2}$ $T = 2$ hrs

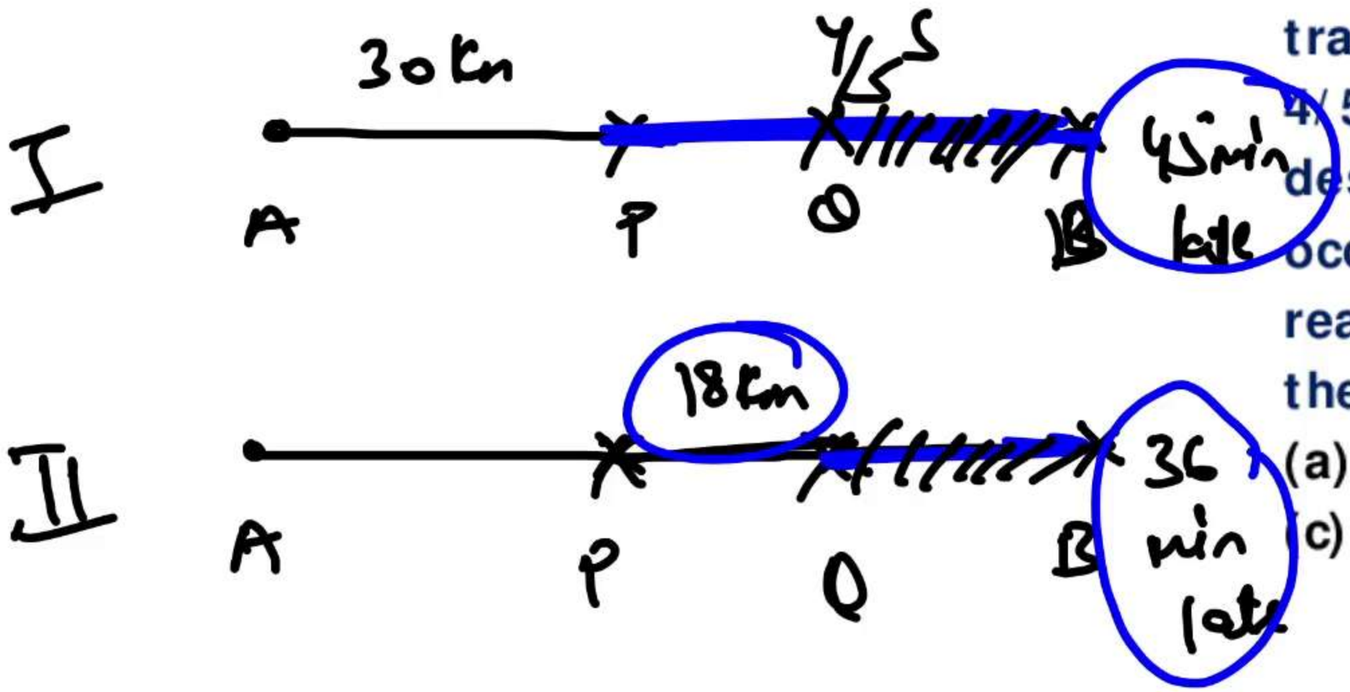
$S \cdot 2 = 200$

$S = 100$ km/h

Q15. A train meets with an accident after travelling 30 kms, after which it moves with 4/5 of its original speed and arrives at the destination 45 minute late. Had the accident occurred 18 kms farther, it would have reached 9 minute earlier. Find the distance of the journey and original speed of the train.

(a) 120 km, 25kmph (b) 125km, 25kmph

(c) 130km, 30kmph (d) 120km, 30kmph



2

$\frac{S \cdot 36}{60} = 18$ 45 : 36

S = 30 km/hr 5 : 4

II (PQ) $S \cdot T = 18$

I (PQ) $\frac{4}{5} S \cdot \frac{5}{4} T = 18$

1 Unit → 18 km

$\frac{1}{4} T = 9$ min

$T = 36$ min

D = 120 km